PATENT ABSTRACTS OF JAPAN

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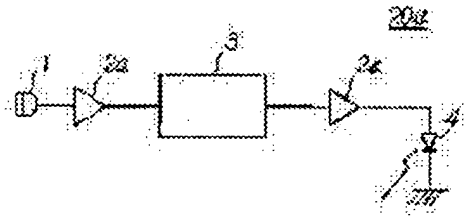
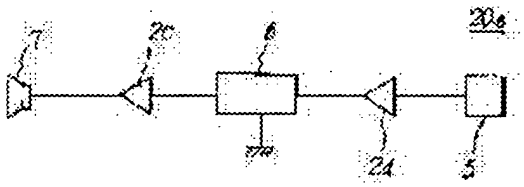
(54) OPTICAL TRANSMITTER-RECEIVER

(57)Abstract:
PURPOSE: To send a voice signal as an optical signal with simple configuration by applying pulse width modulation to the voice signal at an optical frequency traced by an audible frequency, sending and receiving the pulse width modulation light, converting the light into an analog voice signal and demodulating the voice signal.
CONSTITUTION: A voice signal inputted to a microphone 1 is converted into a rectangular pulse width modulation (PWM) pulse by a pulse width modulator 3 being a conversion means for a signal at an optical frequency band through an amplifier 2a. The PWM signal optical pulse subject to pulse width modulation is converted into an infrared ray light by an infrared ray light emission diode 4 being a transmission means through an amplifier 2b and sent in space. Then, the optical pulse sent through space is received by an infrared ray receiving element 5 being the light receiving means, demodulated into the original audible frequency voice signal by a low pass filter 6 being a demodulation means through an amplifier 2d and outputted as a voice via a speaker 7 or the like through an amplifier 2c.





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CLAIMS

[Claim(s)]
[Claim 1] A modulation means to carry out Pulse Density Modulation of the analog sound signal to a transmitter in an optical frequency region, A receiving means to receive the Pulse-Density-Modulation wave which was equipped with a transmitting means to transmit the Pulse-Density-Modulation wave modulated by said modulation means, and was transmitted to the receiver from said transmitting means, The optical transmitter-receiver characterized by having a recovery means to restore to the Pulse-Density-Modulation wave which received with said receiving means to an analog sound signal, and an output means to output as voice the analog sound signal to which it restored with said recovery means.
[Claim 2] A modulation means to carry out Pulse Density Modulation of the analog sound signal to a transmitter in an optical frequency region, A recovery means to restore to the Pulse-Density-Modulation wave which was equipped with a transmitting means to transmit the Pulse-Density-Modulation wave of the optical frequency region modulated with said modulation means, and received with said receiving means to the receiver to an analog sound signal, A sign input means to be equipped with an output means to output as voice the analog sound signal to which it restored with said recovery means, and to input sign information further, The sign / a light pulse conversion means to change the inputted sign information into an optical frequency region pulse, A light pulse light-receiving means to receive the light pulse which is equipped with a light pulse transmitting means to transmit a light pulse with the pulse width according to the optical frequency region pulse outputted from said sign / light pulse conversion means, and is transmitted from said light pulse transmitting means, The optical transmitter-receiver characterized by having a sign information interpretation means to read the sign information inputted into said sign input means in the light pulse signal received with said light pulse light-receiving means.
[Claim 3] A modulation means to carry out Pulse Density Modulation of the analog sound signal to a transmitter in an optical frequency region, A sign input means to receive the Pulse-Density-Modulation wave modulated by said modulation means, to be equipped with a transmitting means to send out the Pulse-Density-Modulation wave in an optical frequency region, and to input sign information, While sending out the sign / light pulse conversion signal outputted from the sign / a light pulse conversion means to change the inputted sign information into an optical frequency region pulse, and this sign / light pulse conversion means to said transmitting means A recovery means to restore to the Pulse-Density-Modulation wave which was equipped with a receiving means to receive the Pulse-Density-Modulation wave sent out from said modulation means, and received with this receiving means to analog voice, The optical transmitter-receiver characterized by having a sign information interpretation means to read sign information based on the sign information which memorized beforehand the sign information inputted into the sign input means, and the loudspeaker which outputs as voice the analog sound signal to which it restored with said recovery means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the optical transmitter-receiver which transmits voice by light.
[0002]
[Description of the Prior Art] The light modulated by voice from the former as equipment which transmits voice using light is transmitted with space or an optical fiber, the transmitted light is received by the optoelectric transducer, for example, photo diode, it changes into an electrical signal, and there are some which were made the configuration which outputs the changed electrical signal as voice by the loudspeaker through amplifier.
[0003]
[Problem(s) to be Solved by the Invention] However, according to the conventional voice transmission equipment which used light in this way, it was carrying out by carrying out amplitude modulation of the light (for example, infrared light) according to the strength level and the frequency of a sound signal more than an audible-sound voice frequency (16000 c/sec), but means (circuitry etc.) to modulate light are complicated. Moreover, as means of communications using infrared light, although there are remote control signal transmitting means, such as television, in addition although there was equipment which transmits a sound signal by infrared light, there was inconvenience that an optical transmission means had to be established. Then, this invention is made in order to remove such inconvenience of the optical transmitter-receiver by the conventional light, and even if it does not perform amplitude modulation according to the strength and the frequency of the amplitude of an audible-sound voice signal which need complicated circuitry, it tends to offer the optical transmitter-receiver which can be constituted easily.
[0004]
[Means for Solving the Problem] In order to attain the above technical problem, the optical transmitter-receiver of this invention A modulation means to carry out Pulse Density Modulation of the analog sound signal to a transmitter in claim 1 in an optical frequency region, A receiving means to receive the Pulse-Density-Modulation wave which was equipped with a transmitting means to transmit the Pulse-Density-Modulation wave modulated by said modulation means, and was transmitted to the receiver from said transmitting means, A recovery means to restore to the Pulse-Density-Modulation wave which received with said receiving means as an analog sound signal, and an output means to output as voice the analog sound signal to which it restored with said recovery means were resembled, and it constituted more.
[0005] Moreover, a modulation means by which claim 2 carries out Pulse Density Modulation of the analog sound signal to a transmitter in an optical frequency region, A recovery means to restore to the Pulse-Density-Modulation wave which was equipped with a transmitting means to transmit the Pulse-Density-Modulation wave of the optical frequency region modulated with said modulation means, and received with said receiving means to the receiver to an analog sound signal, A sign input means to be

equipped with an output means to output as voice the analog sound signal to which it restored with said recovery means, and to input sign information further, The sign / a light pulse conversion means to change the inputted sign information into an optical frequency region pulse, A light pulse transmitting means to transmit a light pulse with the pulse width according to the optical frequency region pulse outputted from said sign / light pulse conversion means, It has a light pulse light-receiving means to receive the light pulse transmitted from said light pulse transmitting means, and a sign information interpretation means to read the sign information inputted into said sign input means in the light pulse signal received with said light pulse light-receiving means.

[0006] Moreover, a modulation means to carry out Pulse Density Modulation of the analog sound signal to a transmitter in claim 3 in an optical frequency region as shown in drawing 5 , A sign input means to receive the Pulse-Density-Modulation wave modulated by said modulation means, to be equipped with a transmitting means to send out the Pulse-Density-Modulation wave in an optical frequency region, and to input sign information, The sign / a light pulse conversion means to change the inputted sign information into an optical frequency region pulse, When the sign / light pulse conversion signal outputted from this sign / light pulse conversion means are sent out to said transmitting means, to ** A recovery means to restore to the Pulse-Density-Modulation wave which was equipped with a receiving means to receive the Pulse-Density-Modulation wave sent out from said modulation means, and received with this receiving means to analog voice, A sign information interpretation means to read a sign based on the sign information which memorized beforehand the sign information inputted into the sign input means, and the loudspeaker which outputs as voice the analog sound signal to which it restored with said recovery means were prepared.

[0007]

[Function] According to claim 1, since it changes into an analog sound signal and restores to voice after performing Pulse Density Modulation and transmitting and receiving this Pulse-Density-Modulation light in the optical frequency region where audio frequency can follow a sound signal, equipment can be simplified. Moreover, by carrying out Pulse Density Modulation of an analog sound signal and the sign information in an optical frequency region according to the optical transmitter-receiver of claim 2, it changes into a lightwave signal with the pulse width of the optical frequency region of the fixed amplitude, and the pulse lightwave signal which performed transmission and reception and received this in the optical frequency region is again changed into analog voice, or it decodes to the sign of a basis, sign information is read, and a configuration can be simplified. Moreover, the modulation means which carries out Pulse Density Modulation of the analog sound signal directly in an optical frequency region according to the optical transmitter-receiver of claim 3, Have a means to change sign information into a light pulse, and it lets the same transmitting means and a receiving means pass for the Pulse-Density-Modulation light and light pulse conversion light which were adjusted by these means. Since voice or sign information is read after changing Pulse-Density-Modulation light into the analog sound signal of a basis, and the sign information on a basis, a configuration can be simplified.

[0008]

[Example] Hereafter, the example of this invention is explained based on a drawing.

Example 1 drawing 1 and drawing 2 show the outline configuration of the optical transmitter-receiver concerning the 1st example of this invention, and drawing 2 of drawing 1 is the block block diagram of receive section 20b about the block block diagram of the telephone transmitter 20a. In the optical transmitter-receiver of this example, as shown in drawing 1 , the sound signal inputted into the microphone 1 is changed into the Pulse-Density-Modulation (PWM) pulse of the square wave form where a wave-like analog sound signal as shown in the curve a of drawing 3 through amplifier 2a with the pulse width modulator 3 which is a conversion means in an optical frequency region is shown in Curve b. This PWM pulse wave is a frequency near the transmission frequency of common infrared light intermediary equipments (for example, remote control of television etc.), and selects the band besides audio frequency. The PWM signal light pulse by which Pulse Density Modulation was carried out when done in this way lets amplifier 2b pass, it is changed into infrared light by the infrared light light emitting diode 4 which is a transmission means, and space transmission is carried out. As an

infrared light photo detector 5 which is a light-receiving means, as light is received for example, with GaAs light emitting diode and it is shown in drawing 2 , after getting over to the audio frequency sound signal of a basis through amplifier 2c with the low-pass **** filter (low Pass Filter) 6 as a recovery means, the light pulse by which space transmission was carried out lets 2d of amplifier pass further, and is outputted as voice through loudspeaker 7 grade. In this example, the member currently used for the infrared remote control transmission equipment which has spread widely can be used for what is used for the infrared light light emitting diodes 4 and 5 as a transmitting means and a receiving means, it is easy to receive, and as shown in drawing 1 and drawing 2 , it can simplify a configuration. Although the optical transmitter-receiver 20 of this example explained the equipment of a configuration of having had one transmitter 20a and receiver 20b of a sound signal at a time, this invention is not restricted to the thing of such a configuration. For example, as shown in a following example 2 and a following example 3, an optical transmitter-receiver is made two configurations which consist of the main frame and hand equipment, transmitter 20a and receiver 20b can be prepared in the main frame and hand equipment, and a bidirectional dialogue can also be enabled between the main frame and hand equipment.

[0009] Example 2 drawing 4 shows the block configuration of the optical transmitter-receiver 21 concerning the 2nd example of this invention. The optical transmitter-receiver 21 of this example consists of 2 of the main frame 8 and hand equipment 9 equipments. The main frame 8 has the infrared light light sensing portion 11, the receiving command interpretation means 13-2 and the pulse width modulator 3 of the optical frequency region of a sound signal, and the infrared light light emitting diodes 18 and 19 (as a light-receiving means). (as a transmitting means) Moreover, the main frame 9 is equipped with the low-pass **** filter 14 and the infrared light-emitting part 10 as the infrared light sensing portion 19, the low-pass **** filter 14, a loudspeaker 7 and the command input (sign information) means 16, the command sign / infrared light pulse conversion means 15 of command information, and a voice recovery means. When sending a voice-told message as a response (response) to the command information given to the main frame 8 from the main frame 9, it can apply to transmitting a voice-told message to hand equipment 9 from the main frame 8, and making it generate in a loudspeaker 7. In this case, since it is not necessary to establish the assembly / storage means of a voice-told message in hand equipment 9, the configuration of hand equipment 9 becomes easy and can be miniaturized as a whole.

[0010] Example 3 drawing 5 shows the block configuration of the optical transmitter-receiver 22 concerning the 3rd example of this invention. The optical transmitter-receiver 22 of this example consists of the main frame 28 and hand equipment 29. The main frame 28 has the infrared light light sensing portion 11, the receiving command interpretation means 13 and the low-pass **** filter 14 as a voice demodulator, and the loudspeaker 17. Moreover, as for hand equipment 29, the infrared issuance section 10, the Pulse-Density-Modulation means 3 of a sound signal, a microphone 1, the command information / infrared pulse conversion means 15, and the command input means (key input etc.) 16 are established. From hand equipment 29, voice and command information are transmitted through common ******** / receiving transmission line if needed. It can carry out Time-Division-Multiplexing transmission of a code (sign information) and the voice in a common infrared light transmission line while being able to constitute it very easily with the usual optical transmission device for codes (sign information) using the diode which emits light in the infrared light of an optical frequency region, since the optical transmitter-receiver 22 of this example is what transmits an audible-sound voice signal.

[0011]

[Effect of the Invention] According to the optical transmitter-receiver of this invention, the optical cycle region luminescence equipment and light-receiving equipment which are usually used can be used, and an optical transmitter-receiver can be made from an easy configuration so that clearly from the above explanation.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block block diagram of the transmitting section of the optical transmitter-receiver of the 1st example of this invention.
[Drawing 2] It is the block block diagram of the receive section of the optical transmitter-receiver of the 1st example of this invention.
[Drawing 3] It is property drawing showing the wave-like relation between the sound signal wave in the optical transmitter-receiver of the example which has the transmitting section and the receive section which show drawing 1 and drawing 2 , and a Pulse-Density-Modulation light pulse.
[Drawing 4] It is the block diagram showing the outline configuration of the optical transmitter-receiver concerning the 2nd example of this invention.
[Drawing 5] It is the block diagram showing the outline configuration of the optical transmitter-receiver concerning the 3rd example of this invention.
[Description of Notations]
1 Microphone
2 Amplifier
3 Modulation Means (Pulse Width Modulator of Optical Frequency Region)
4 Five Infrared emitting diode
6 Recovery Means
7 Loudspeaker
13 Sign Information Interpretation Means
14 Lowpass Filter (Demodulator)
8 28 Main frame
9 29 Hand equipment
21 22 Optical transmitter-receiver (this invention)

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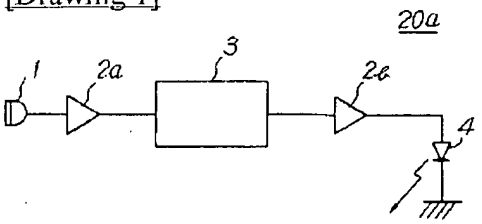
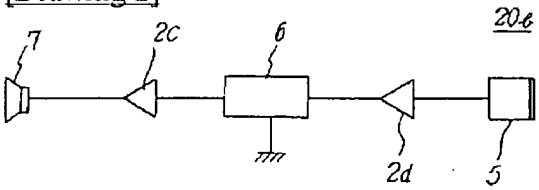
DRAWINGS

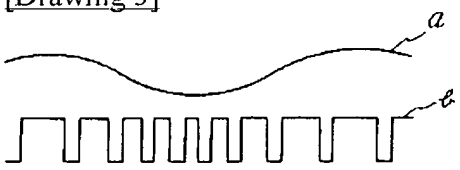
[Drawing 1]



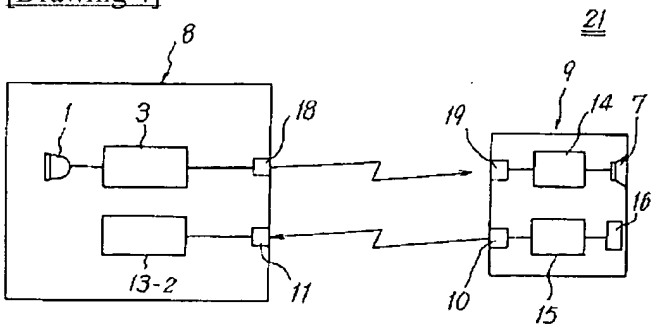
[Drawing 2]



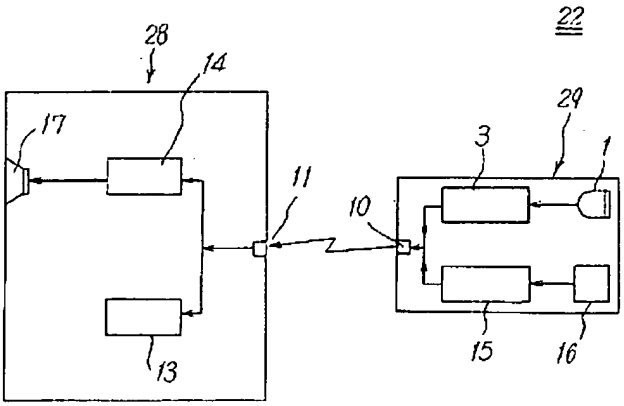
[Drawing 3]



[Drawing 4]



[Drawing 5]



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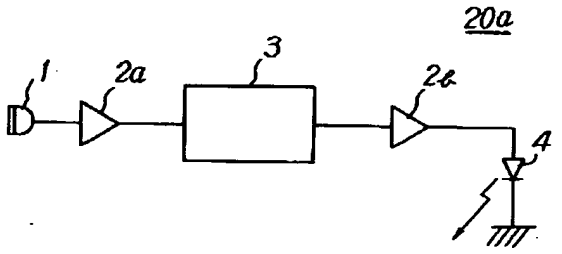
(54)【発明の名称】　光送受信装置

(57)【要約】
【目的】　構成が簡単で音声を光伝送できる光送受信装置を提供すること。
【構成】　アナログ音声信号を光周波数域でパルス幅変調し、このパルス幅変調された光パルスを赤外発光ダイオード４によって送信し、受信した光パルス信号をアナログ音声に変換する。



1

【特許請求の範囲】

【請求項1】　送信器にアナログ音声信号を光周波数域でパルス幅変調させる変調手段と、
前記変調手段により変調されたパルス幅変調波を送信する送信手段とを備え、
受信器に前記送信手段より送信されたパルス幅変調波を受信する受信手段と、
前記受信手段で受信したパルス幅変調波をアナログ音声信号に復調する復調手段と、
前記復調手段により復調されたアナログ音声信号を音声として出力する出力手段と、を備えたことを特徴とする光送受信装置。

【請求項2】　送信器にアナログ音声信号を光周波数域でパルス幅変調させる変調手段と、
前記変調手段で変調された光周波数域のパルス幅変調波を送信する送信手段とを備え、
受信器に前記受信手段で受信したパルス幅変調波をアナログ音声信号に復調する復調手段と、
前記復調手段によって復調されたアナログ音声信号を音声として出力する出力手段とを備え、
さらに、符号情報を入力する符号入力手段と、
入力した符号情報を光周波数域パルスに変換する符号／光パルス変換手段と、
前記符号／光パルス変換手段から出力される光周波数域パルスに応じたパルス幅をもつ光パルスを送信する光パルス送信手段とを備え、
前記光パルス送信手段より送信される光パルスを受信する光パルス受光手段と、
前記光パルス受光手段で受信した光パルス信号から前記符号入力手段に入力した符号情報を読み取る符号情報解釈手段とを備えたことを特徴とする光送受信装置。

【請求項3】　送信器にアナログ音声信号を光周波数域でパルス幅変調させる変調手段と、
前記変調手段により変調されたパルス幅変調波を受信し、光周波数域でのパルス幅変調波を送出する送信手段とを備え、
符号情報を入力する符号入力手段と、
入力した符号情報を光周波数域パルスに変換する符号／光パルス変換手段と、
この符号／光パルス変換手段より出力される符号／光パルス変換信号を前記送信手段へ送出すると共に、前記変調手段から送出されるパルス幅変調波を受信する受信手段とを備え、
この受信手段で受信したパルス幅変調波をアナログ音声に復調する復調手段と、符号入力手段に入力した符号情報を予め記憶した符号情報に基づいて符号情報を読み取る符号情報解釈手段と、
前記復調手段により復調されたアナログ音声信号を音声として出力するスピーカと、を備えたことを特徴とする光送受信装置。

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【発明の詳細な説明】

【0001】

【産業上の利用分野】この発明は、光によって音声を伝送する光送受信装置に関する。

【0002】

【従来の技術】光を利用して音声を伝送する装置として、従来から、音声によって変調された光を空間又は光ファイバにより伝送し、伝送された光を、光電変換素子例えばホトダイオードで受光し、電気信号に変換し、変換された電気信号を増幅器を介してスピーカにより音声として出力する構成にしたものがある。

【0003】

【発明が解決しようとする課題】ところが、このように光を利用した従来の音声伝送装置によると、可聴音声周波数（16000c／sec ）以上の音声信号の強弱レベル及び周波数に応じて光（例えば赤外光）を振幅変調することにより行っていたが、光を変調する手段（回路構成等）が複雑である。また、赤外光を利用した通信手段として、例えばテレビジョン等のリモート制御信号送信手段があるが、その他に、音声信号を赤外光で伝送する装置があるが、光伝送手段を設けなければならないという不都合があった。そこで、この発明は、従来の光による光送受信装置のこのような不都合を除去するためになされたものであって、複雑な回路構成を必要とする可聴音声信号の振幅の強弱及び周波数に応じて振幅変調を行わなくとも容易に構成できる光送受信装置を提供しようとするものである。

【0004】

【課題を解決するための手段】以上の課題を達成するため、本発明の光送受信装置は、請求項1では、送信器にアナログ音声信号を光周波数域でパルス幅変調させる変調手段と、前記変調手段により変調されたパルス幅変調波を送信する送信手段とを備え、受信器に前記送信手段から送信されたパルス幅変調波を受信する受信手段と、前記受信手段で受信したパルス幅変調波をアナログ音声信号として復調する復調手段と、前記復調手段により復調されたアナログ音声信号を音声として出力する出力手段と、により構成した。

【0005】また、請求項2は、送信器にアナログ音声信号を光周波数域でパルス幅変調させる変調手段と、前記変調手段で変調された光周波数域のパルス幅変調波を送信する送信手段とを備え、受信器に前記受信手段で受信したパルス幅変調波をアナログ音声信号に復調する復調手段と、前記復調手段によって復調されたアナログ音声信号を音声として出力する出力手段とを備え、さらに、符号情報を入力する符号入力手段と、入力した符号情報を光周波数域パルスに変換する符号／光パルス変換手段と、前記符号／光パルス変換手段から出力される光周波数域パルスに応じたパルス幅をもつ光パルスを送信する光パルス送信手段と、前記光パルス送信手段より送

信される光パルスを受信する光パルス受光手段と、前記光パルス受光手段で受信した光パルス信号から前記符号入力手段に入力した符号情報を読み取る符号情報解釈手段とを備えたものである。

【0006】また、請求項3では、図5に示すように、送信器にアナログ音声信号を光周波数域でパルス幅変調させる変調手段と、前記変調手段により変調されたパルス幅変調波を受信し、光周波数域でのパルス幅変調波を送出する送信手段とを備え、符号情報を入力する符号入力手段と、入力した符号情報を光周波数域パルスに変換する符号／光パルス変換手段と、この符号／光パルス変換手段より出力される符号／光パルス変換信号を前記送信手段へ送出すると供に、前記変調手段から送出されるパルス幅変調波を受信する受信手段とを備え、この受信手段で受信したパルス幅変調波をアナログ音声に復調する復調手段と、符号入力手段に入力した符号情報を予め記憶した符号情報に基づいて符号を読み取る符号情報解釈手段と、前記復調手段により復調されたアナログ音声信号を音声として出力するスピーカと、を設けた。

【0007】

【作用】請求項1によれば、音声信号を可聴周波数が追従できる光周波数域でパルス幅変調を行い、このパルス幅変調光を送信及び受信した後、アナログ音声信号に変換して音声を復調するから、装置が簡単化できる。また、請求項2の光送受信装置によれば、アナログ音声信号及び符号情報を光周波数域でパルス幅変調することで、一定振幅の光周波数域のパルス幅をもつ光信号に変換し、これを光周波数域で送信及び受信を行い、受信したパルス光信号を再びアナログ音声に変換するか、もとの符号に復号して符号情報を読み取るもので、構成が簡単化できる。また、請求項3の光送受信装置によれば、アナログ音声信号を直接に、光周波数域でパルス幅変調する変調手段と、符号情報を光パルスに変換する手段とを、備え、これらの手段によって調整されたパルス幅変調光および光パルス変換光を同一の送信手段及び受信手段を通して、パルス幅変調光をもとのアナログ音声信号、もとの符号情報に変換した後、音声あるいは符号情報を読み取るため、構成が簡単化できる。

【0008】

【実施例】以下、図面に基づいて、この発明の実施例について説明する。

実施例1

図1及び図2は、本発明の第1の実施例にかかる光送受信装置の概略構成を示し、図1はその送話器２０ａのブロック構成図を、図2は受信部２０ｂのブロック構成図である。本実施例の光送受信装置では、図1に示すように、マイクロホン1に入力した音声信号は、増幅器２ａを通して光周波数域での変換手段であるパルス幅変調器3により図3の曲線ａに示すような波形のアナログ音声信号を、曲線ｂに示すような矩形波形のパルス幅変調（ＰＷＭ）パルスに変換する。このＰＷＭパルス波は、一般的な赤外光伝装置（例えば、テレビジョンのリモコン等）の伝送周波数に近い周波数で、可聴周波数外の帯域を選定する。このようにするとパルス幅変調されたＰＷＭ信号光パルスは、増幅器２ｂを通して、送話手段である例えば赤外光発光ダイオード４により赤外光に変換され空間伝送される。空間伝送された光パルスは、受光手段である赤外光受光素子５として、例えば、ＧａＡｓ発光ダイオードで受光され、図2に示すように、増幅器２ｃを通して復調手段としての低域濾波フィルタ（low Pass Filter ）６により、もとの可聴周波数音声信号に復調した後、さらに増幅器２ｄを通して、スピーカ７等を介して音声として出力される。本実施例において、送信手段及び受信手段としての赤外光発光ダイオード４、５に使用するものは、広く普及している赤外線リモコン伝送装置等に使われている部材を用いることができ、入手が容易であり、図1及び図2に示すように、構成が簡単化できる。本実施例の光送受信装置２０は、音声信号の送信器２０ａと、受信器２０ｂを１個ずつ備えた構成の装置について説明したが、本発明は、このような構成のものに限られるものではない。例えば、次の実施例２及び実施例３に示すように、光送受信装置を、本体装置と、手元装置とから成る二構成にし、本体装置及び手元装置に、送信器２０ａと受信器２０ｂとを設け、本体装置と手元装置間に双方向の対話を可能にすることもできる。

【0009】実施例2

図4は、本発明の第2の実施例にかかる光送受信装置２１のブロック構成を示す。本実施例の光送受信装置２１は、本体装置８及び手元装置９の二装置から成っている。本体装置８は、赤外光受光部１１と、受信コマンド解釈手段１３－２、音声信号の光周波数域のパルス幅変調器３と、赤外光発光ダイオード１８（送信手段として）、１９（受光手段として）を有している。また、本体装置９は、赤外受光部１９、低域濾波フィルタ１４と、スピーカ７及び、コマンド入力（符号情報）手段１６と、コマンド情報のコマンド符号／赤外光パルス変換手段１５と、音声復調手段としての低域濾波フィルタ１４と、赤外発光部１０とを備えている。本体装置９から、本体装置８に与えたコマンド情報に対するレスポンス（response）として、例えば、音声メッセージを送る場合は、本体装置８から手元装置９へ音声メッセージを送信して、スピーカ７で発生させることに応用できる。この場合、音声メッセージの組み立て／記憶手段を手元装置９内に設けておく必要がないから、手元装置９の構成は簡単になり、全体として小型化できる。

【0010】実施例3

図5は、本発明の第3の実施例にかかる光送受信装置２２のブロック構成を示す。本実施例の光送受信装置２２は、本体装置２８と、手元装置２９とから成っている。

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本体装置２８は、赤外光受光部１１と、受信コマンド解釈手段１３、音声復調器としての低域濾波フィルタ１４と、スピーカ１７とを有している。また、手元装置２９は、赤外発行部１０と、音声信号のパルス幅変調手段３と、マイクロホン１と、コマンド情報／赤外パルス変換手段１５と、コマンド入力手段（キー入力等）１６が設けられている。手元装置２９からは、音声及びコマンド情報が必要に応じて共通の赤外光送／受信伝送路を通して伝達される。本実施例の光送受信装置２２は、光周波数域の赤外光を発光するダイオード等を用いた通常のコード（符号情報）用光伝送装置によって、可聴音声信号の伝送を行うものであるため、極めて簡単に構成できるとともに、コード（符号情報）と音声を共通の赤外光伝送路で時分割多重伝送することができる。

【００１１】

【発明の効果】以上の説明から明らかなように、本発明の光送受信装置によれば、通常使用される光周波域発光装置及び受光装置を使用し、簡単な構成で、光送受信装置を作ることができる。

【図面の簡単な説明】

【図１】本発明の第１の実施例の光送受信装置の送信部のブロック構成図である。

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【図２】本発明の第１の実施例の光送受信装置の受信部のブロック構成図である。

【図３】図１及び図２に示す送信部及び受信部を有する実施例の光送受信装置における音声信号波形とパルス幅変調光パルスの波形の関係を示す特性図である。

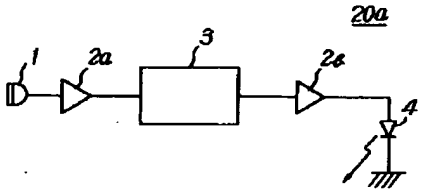
【図４】本発明の第２の実施例にかかる光送受信装置の概略構成を示すブロック図である。

【図５】本発明の第３の実施例にかかる光送受信装置の概略構成を示すブロック図である。

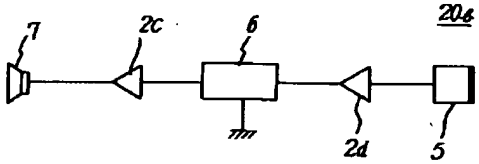
【符号の説明】

１　マイクロホン
２　増幅器
３　変調手段（光周波数域のパルス幅変調器）
４、５　赤外発光ダイオード
６　復調手段
７　スピーカ
１３　符号情報解釈手段
１４　低域沪波フィルタ（復調器）
８，２８　本体装置
９，２９　手元装置
２１，２２　光送受信装置（本発明）

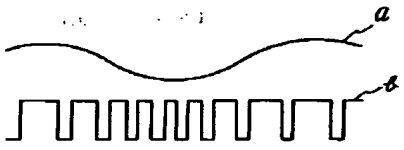
【図1】



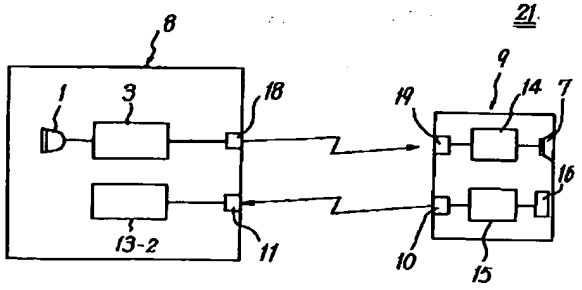
【図2】



【図3】



【図4】



【図5】